

T. A. EDISON.
 PHONOGRAPHIC RECORDING STYLUS.
 APPLICATION FILED JAN. 3, 1907. RENEWED OCT. 7, 1909.

1,024,839.

Patented Apr. 30, 1912.

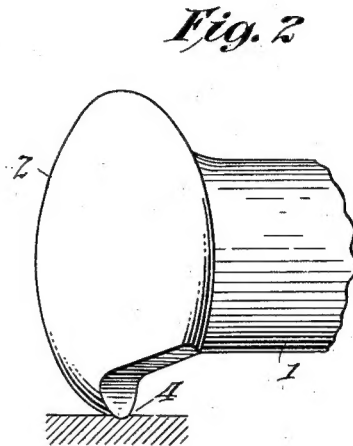
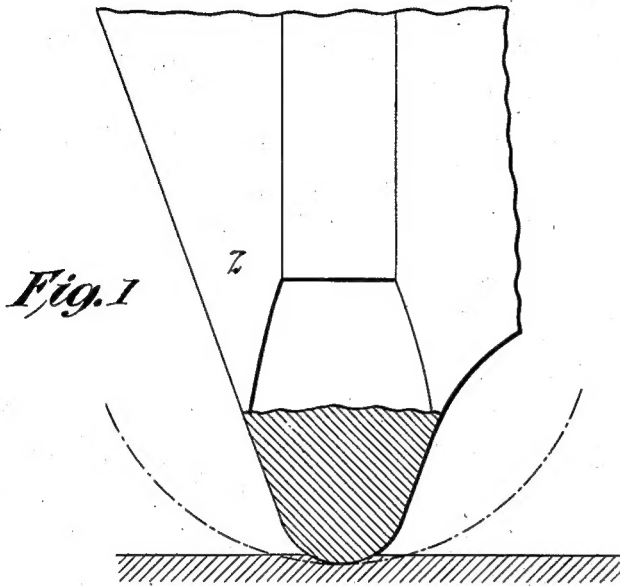


Fig. 3

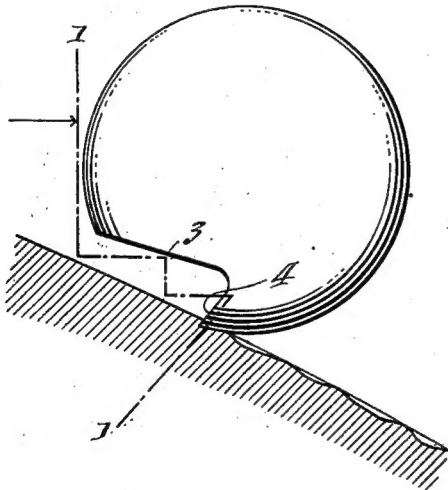


Fig. 4

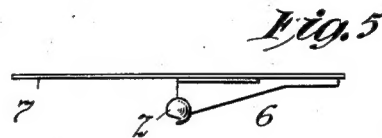
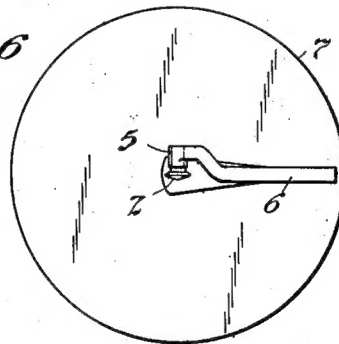


Fig. 6



Witnesses:

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UNITED STATES PATENT OFFICE.

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PHONOGRAPHIC RECORDING-STYLUS.

1,024,839.

Specification of Letters Patent.

Patented Apr. 30, 1912.

Application filed January 3, 1907, Serial No. 350,647. Renewed October 7, 1909. Serial No. 521,490.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographic Recording-Styli, of which the following is a description.

My invention relates to an improved phonographic recording stylus, and my object is to provide a device for the purpose in which a very perfect curved cutting edge can be formed of very small diameter.

At the present time the available path on the blank for the accommodation of the record is one one-hundredth of an inch (.01"), since this is the standard pitch originally proposed by me and now adopted universally by talking machine manufacturers. The recorders at present used present a substantially circular cutting edge the diameter of which is about four one-hundredths of an inch (.04"). I now propose to make phonograph records with a pitch of two hundred threads per inch, the advantages of which are explained in an application for Letters Patent filed on even date herewith.

In order to form a record in a path one-half as wide as that now presented, and of the same depth as that now formed, the recording stylus should not, as might be supposed, be one-half the diameter, but it is necessary that it should be substantially one-fourth the diameter of that now employed, namely, about one one-hundredth of an inch. Even, in the manufacture of a recording stylus four one-hundredths of an inch in diameter the operation is a difficult one, requiring labor of the highest skill, machines of great delicacy of adjustment and construction, and most of the operations have to be performed under the microscope. Yet with these precautions there is very considerable loss by breakage, since the material used, sapphire, although extremely hard, is very brittle and of little bodily strength, so that it chips and cracks readily. To attempt to form a recording stylus only one one-hundredth of an inch in diameter of this material by present processes and machines, and of the present type or form, might be possible as a mechanical phenomenon, but I do not believe it can ever be done in a com-

mercially practical way. I have therefore sought to modify the shape of the recording stylus whereby it may be readily made with a cutting edge of smaller diameter and at the same time its shape will be such that the production of sharp angles is avoided, and sufficient material always presented to reduce cracking or chipping to a minimum.

My improved recording stylus comprises a shank on the end of which is formed a circular or parti-circular head somewhat like the head of a pin, whose periphery presents in cross section the proper curve for the cutting edge, and the head is cut away or notched to result in the production of a cutting edge somewhat similar to that employed on an enormously larger scale in a shape tool. The stylus so obtained is mounted in a suitable socket so that the cutting edge will be properly presented to the blank, and is carried by or affixed to the diaphragm in any suitable way.

In order that the invention may be better understood, attention is directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 is a sectional view on the line 1-1 of Fig. 3, at the cutting edge of the improved stylus showing the same greatly enlarged, and illustrating by dotted lines the relative shape of recorders now used having a diameter of four one-hundredths of an inch; Fig. 2, a perspective view of the improved stylus enlarged to one-fourth the scale of Fig. 1; Fig. 3, a front view of the same on the same scale at Fig. 2, and showing the stylus engaging a blank; Fig. 4, an end view of the stylus on a smaller scale, showing the same mounted on a diaphragm; Fig. 5, a front view of the same, and Fig. 6 a plan view of the same.

In these views corresponding parts are represented by the same numerals of reference.

The stylus, as heretofore, is made preferably of sapphire. It is formed with a shank 1 about five one-hundredths of an inch in diameter and of any suitable length, say, $\frac{3}{8}$ ". At its end it is turned with a button shaped head 2 of somewhat larger diameter, say, about nine one-hundredths of an inch. As shown in Fig. 1, this head is tapered toward its periphery so as to make a strong and readily formed construction which can

be produced in a small lathe. The periphery of the head 2 is formed with a curve which in cross section presents substantially the shape desired for the cutting edge. 5 This curve is not mathematically the exact shape of the cutting edge for the reason that in forming the latter the head 2 is not cut way on a diametric line, and consequently the form of the cutting edge will 10 be slightly more elliptical than a true section through the head 2. The head 2 is notched or cut away at 3 to form the cutting edge 4 which can be done by a suitable rotating tool. In forming this notched or 15 cut-away portion the material is not removed at the angle thereof, but a curve is presented (see Fig. 3) to reduce to a minimum chipping or breaking in this operation. In mounting the improved stylus, the shank 20 1 is received and tightly secured by cement, or otherwise, in a suitable socket 5, which may be carried by a light frame 6 cemented to the diaphragm 7. It will be obvious that my improved recording stylus, although it presents a cutting edge of extremely small diameter, does not involve 25 operations any more delicate than those now performed in making a stylus which is in fact four times as large, and at the same time the material is so disposed that there is no greater danger of cracking or breaking than in the manufacture of a stylus of the existing standard. 30

In Fig. 1, I illustrate diagrammatically 35 a comparison between my improved stylus whose cutting edge presents substantially a circle one one-hundredth of an inch in diameter, and a stylus as now constructed whose cutting edge presents a circle four one-hundredths of an inch in diameter. It will be 40 seen that although the former is only about one-fourth the diameter of the latter, yet

in cutting to the same depth it occupies one-half the width of the blank.

Having now described my invention, what 45 I claim as new and desire to secure by Letters Patent, is as follows:

1. A recording stylus comprising a disk-like head having a curved periphery formed with a notch therein to present a cutting 50 edge, the plane surface of which is transverse to the plane of said periphery, substantially as set forth.

2. A recording stylus comprising a disk-like head with a notch cut in said head said 55 notch being formed with two converging substantially plane surfaces connected by a curved surface, substantially as set forth.

3. A recording stylus comprising a shank and a disk-shaped head increasing in thick- 60 ness from its periphery toward its center and formed with a notch presenting a curved cutting edge, substantially as set forth.

4. A recording stylus consisting of a jewel 65 having a rounded periphery and formed with a notch which presents a substantially circular cutting edge having a diameter of less than two one-hundredths of an inch, 70 substantially as set forth.

5. A recording stylus consisting of a jewel 75 formed with a shank and a disk-shaped head which increases in thickness from its periphery toward its center, said head being formed with a notch which presents a substantially circular cutting edge having a diameter of less than two one-hundredths of an inch, substantially as set forth.

This specification signed and witnessed this 28th day of December 1906.

THOS. A. EDISON.

Witnesses:

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